DURHAM
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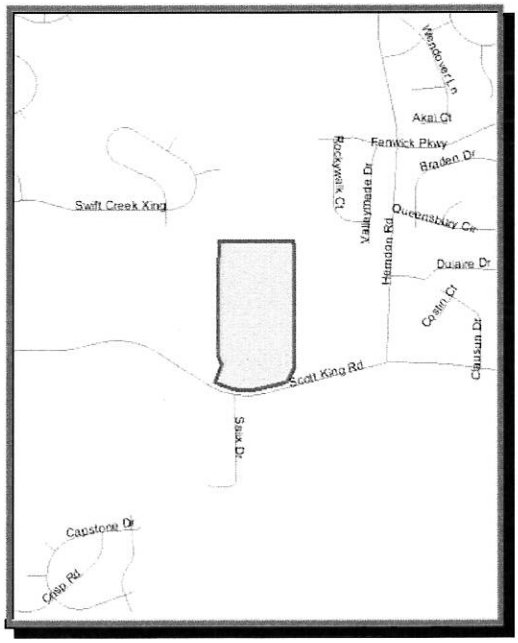
CITY OF MEDICINE

Project Manual

CITY OF DURHAM

Herndon Park – Soccer Field Upgrades

Herndon Park
511 Scott King Road



OWNER: CITY OF DURHAM
101 CITY HALL PLAZA
DURHAM, NORTH CAROLINA 27701

General Services Department
2011 Fay Street
Durham, NC 27704
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December 2, 2014

CITY OF DURHAM, NORTH CAROLINA

MAYOR: WILLIAM V. "BILL" BELL

COUNCIL MEMBERS:

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CITY ATTORNEY: PATRICK W. BAKER

CITY CLERK: D. ANN GRAY

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 02 – SPECIFICATIONS

EXHIBITS

SECTION 01100 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project includes upgrading the existing Herndon Park natural turf field to a synthetic turf cross section. Work will include acquisition of land disturbance permit, provide soil and erosion control measures, excavate the top soil section, fine grade, install concrete mow curb, install perimeter subsurface drainage, supply and gravel sub-base, install base material, install new synthetic turf field and new fencing. The field shall be pre-striped with a DPR Logo, a competition size soccer field and two flag football fields. This work will also include drainage repairs to the existing turf field. Hauling and disposal shall comply with regulations of authorities having jurisdiction. Any soil left un-vegetated after the construction activities shall be seeded and level with the surrounding grades.

1. Project Locations: City of Durham Parks and Recreation Facilities
   a. Herndon Park – 511 Scott King Road, Durham, NC 27713
2. Owner: City of Durham.

B. The Work consists of the following:
1. Obtain Land Disturbance Permits
2. Grading excavation
3. Soil Erosion and Sediment Control
4. Site Drainage Improvements
5. New Synthetic Turf Field
6. Repairs to existing Turf field
7. Fencing
8. Concrete ADA adjustments
9. Landscape grading and Seeding

1.3 CONTRACT

A. Project will be constructed through the National Joint Powers Alliance (NJPA)

1.4 USE OF PREMISES

A. Contractor shall have limited use of premises within construction limits for construction operations, including use of Project site, during construction period. Contractor's use of

premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project. Refer to Exhibit A – Site Plan.

B. Contractor will be provided areas for material staging and parking. Keep drive lanes and parking spaces available to the public.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authority having jurisdiction.

B. On-Site Work Hours: Normal business working hours Monday through Friday.

1. Obtain approval from the City of Durham for extended hours of work and other special requests pertaining to construction activities.

C. Existing Utility Interruptions: Do not interrupt utilities in the area unless permitted under the following conditions:

1. Notify the City of Durham not less than two days in advance of proposed utility interruptions.

2. Obtain the City's written permission before proceeding with utility interruptions.

1.6 SPECIFICATION FORMATS AND CONVENTIONS (Not Used)

1.7 PRODUCTS (Not Used)

1.8 EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Purchase Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. The Owner will issue through the supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: owner will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include an updated Contractor's Construction Schedule and schedule of values that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Construction Project Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, owner will issue a Change Order for signatures of Owner and Contractor on City of Durham Standard change order form.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Designer may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01290 - PAYMENT PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contrac and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

3. Section 01250 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
4. Section 01320 "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule of Values and Submittals Schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

   a. Application for Payment forms with Continuation Sheets.
   b. Submittals Schedule.

2. Submit the Schedule of Values to Owner through Construction Project Manager at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Owner
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Owner and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Owner will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Owner by a method ensuring receipt within 24 hours. One copy shall include waivers of lien, sub-contractor's report, and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Submittals Schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.

8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.
13. Data needed to acquire Owner's insurance.
14. Initial settlement survey and damage report if required.
15. Results from all required testing.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.
10. As-built documentation, warranties & manuals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.
   a. Irrigation Valves and heads
   b. Site furnishings (bleachers, benches, etc.)

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Indicate construction circulation/access and parking for review and approval.

B. Staff Names: At the start of construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office and mobile telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within (3) days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner, Construction Manager, and Architect, but no later than (7) days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing.
    d. Designation of responsible personnel.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for processing Applications for Payment.
    g. Distribution of the Contract Documents.
    h. Submittal procedures.
    i. Preparation of Record Documents.
    j. Use of the premises.
    k. Responsibility for temporary facilities and controls.
    l. Parking availability.
    m. Office, work, and storage areas.

n. Equipment deliveries and priorities.
o. First aid.
p. Security.
q. Progress cleaning.
r. Working hours.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Construction Manager of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Submittals.
g. Review of mockups.
h. Possible conflicts.
i. Compatibility problems.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written recommendations.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Required performance results.
u. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner, Construction Manager and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Work hours.
        10) Hazards and risks.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Change Orders.
        14) Documentation of information for payment requests.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

    a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Construction Manager and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction

Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Weekly construction reports.
4. Field condition reports.
5. Construction photographs.

B. Related Sections include the following:

1. Section 01290 "Payment Procedures" for submitting the Schedule of Values.
2. Section 01330 "Submittal Procedures" for submitting schedules and reports.
3. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.
4. Section 01770 "Closeout Procedures" for submitting Project Record Documents at Project closeout.

1.3 DEFINITIONS

A. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

1.4 SUBMITTALS

A. Qualification Data: For firms and persons specified in "Quality Assurance" Article and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Submittals Schedule: Submit three (3) copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Name of subcontractor.
3. Description of the Work covered.
4. Scheduled date for Owner's Representative final release or approval.

C. Contractor's Construction Schedule: Submit two (2) printed copies of initial schedule large enough to show entire schedule for entire construction period.
   a. Submit an electronic copy of schedule, in MS Project, MS Excel, or MS Word format, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

D. Weekly Construction Reports: Submit two (2) copies at monthly pay applications.

E. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

   1. Secure time commitments for performing critical elements of the Work from parties involved.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Submit proposed construction schedule to Architect within seven days of date established for the Notice to Proceed. Provide updated Construction schedules with each pay application.
   1. Indicate each significant construction activity separately.
   2. Monitor construction and update schedule for reporting progress. Indicate an estimated completion for each activity.
   3. Note the critical path on the schedule.

2.3 REPORTS

A. Weekly Construction Reports: Prepare a weekly construction report recording the following information concerning events at Project site and submit relevant copies with pay applications:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Meetings and significant decisions.
7. Unusual events (refer to special reports).
8. Stoppages, delays, shortages, and losses.
9. Orders and requests of authorities having jurisdiction.
10. Change Orders received and implemented.
11. Construction Change Directives received.
12. Services connected and disconnected.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with each pay application.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. As the Work progresses, indicate Actual Completion percentage for each activity.
3. Distribution: Distribute copies of approved schedule to Architect and Owner.

3.2 CONSTRUCTION PHOTOGRAPHS

A. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
B. Preconstruction Photographs: Before starting construction, take color photographs of Project site and surrounding properties from different vantage points. Show existing conditions adjacent to property.
C. Periodic Construction Photographs: Take photographs weekly, coinciding with cutoff date associated with each pay application. Select vantage points to best show staus of construction and progress since last photographs were taken. Provide hard copies or electronic copies to Construction Project Manager with pay applications.
D. Final Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as Project Record Documents.

END OF SECTION 01320

SECTION 01330 SUBMITTALS

PART 1: GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. Related Sections include the following:

1. Section 01290 "Payment Procedures" for submitting Applications for Payment.
2. Section 01700 "Closeout Procedures" for submitting warranties Project Record Documents and operation and maintenance manuals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Owner's responsive action.

B. Informational Submittals: Written information that does not require Owner's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Owner's Representative reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owner's Representative receipt of submittal.

1. Initial Review: Allow seven (7) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Designer will advise Contractor when a submittal being processed must be delayed for coordination.
2. If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Allow seven (7) days for processing each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

C. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Construction Project Manager.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Owner.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Unique identifier, including revision number.
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Other necessary identification.

D. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

E. Additional Copies: Unless additional copies are required for final submittal, and unless Designer or Construction Project Manager observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Submit four copies of submittal to Owner's Representative.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Designer will discard submittals received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:

    a. Project name.
    b. Date.
    c. Destination (To:).
    d. Source (From:).
    e. Names of subcontractor, manufacturer, and supplier.
    f. Category and type of submittal.

g. Submittal purpose and description.
h. Submittal and transmittal distribution record.
i. Remarks.
j. Signature of transmitter.

G. Use for Construction: Use only final submittals with mark indicating action taken by Designer connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies: Submit three (3) copies of each submittal, unless otherwise indicated. Owner will return one (1) copies.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Standard product operating and maintenance manuals.
f. Compliance with recognized trade association standards.
g. Compliance with recognized testing agency standards.
h. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:

a. Notation of dimensions established by field measurement.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Schedules.
f. Design calculations.
g. Pressure loss calculations.
h. Compliance with specified standards.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 11 by 17 inches.

3. Number of Copies: Submit three (3) prints of each submittal, unless prints are required for operation and maintenance manuals. Submit five (5) prints where prints are required for operation and maintenance manuals. Architect will retain two (2) prints; remainder will be returned.

D. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Section 01400 "Quality Requirements" for mockups.
2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Owner's Representative sample where so indicated. Attach label on unexposed side that includes the following:

   a. Description of Sample including any certificates and pertaining assurances.
   b. Product name or name of manufacturer.
   c. Sample source.

5. Submit Samples for review of kind, color, pattern, material, warranty, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
   a. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Number of Samples for Initial Selection: Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
7. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two (2) copies of each submittal, unless otherwise indicated. Designer and Construction Project Manager will not return copies.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements in Section 01400 "Quality Requirements."

B. Construction Schedule: Comply with requirements in Section 01320 "Construction Progress Documentation."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project; include evidence of installation experience.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with all requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 01770 "Closeout Procedures".

N. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

O. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

P. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

Q. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

R. Construction Photographs and Videotapes: Comply with requirements in Division 1 Section "Construction Progress Documentation."

S. Material Safety Data Sheets: Submit information directly to Owner.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Designer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 OWNER'S REPRESENTATIVE

A. General: Owner will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Owner will review each submittal, make marks to indicate corrections or modifications required, and return it.

C. Informational Submittals: Owner will review each submittal and will not return it, or will reject and return it if it does not comply with requirements.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Owner or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Owner.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: A firm with then (10) years documented experience in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

E. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1.6 QUALITY CONTROL

A. Owner's Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Cost for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with the Owner's Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Owner, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.

5. Do not perform any duties of Contractor.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements, as necessary, for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities may include, but are not limited to, the following:

1. Temporary utilities, support facilities, and security and protection facilities.
2. Lighting.

C. Support facilities include, but are not limited to, the following:

1. Project identification and temporary signs.
2. Construction aids and miscellaneous services and facilities.
3. Portable Toilet.

D. Security and protection facilities may include, but are not limited to, the following:

1. Environmental protection.
2. Tree and plant protection.
3. Site enclosure fence.
4. Security enclosure and lockup.
5. Barricades, warning signs, and lights.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to Owner and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner's construction representatives.
2. Occupants of Project.
3. Testing agencies.
4. Personnel of authorities having jurisdiction.

1.4 SUBMITTALS

A. Implementation and Termination Schedule: Within fifteen (15) days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.5 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - EXECUTION

2.1 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate sanitary facilities for easy access.

B. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

2.2 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and sub-grade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains if determined necessary by the Owner.

2.3 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 01500

SECTION 01600: CLEANING UP

PART 1: GENERAL

1.1 General

a) The requirements specified in this section are in addition to those described in the General Conditions.

b) All debris and waste materials shall become the property of the Contractor, and shall be removed from the site as it accumulates and so as to comply with anti-pollution laws.

c) Burning or burying of rubbish and waste materials on the project site is not permitted.

d) Disposal of volatile fluid wastes such as mineral spirits, oil, or paint thinner in storm or sanitary sewer systems is not permitted, nor shall such materials be deposited anywhere on the project site.

PART 2: MATERIALS

2.1 Materials

The Contractor shall:

a) Use only cleaning materials recommended by the manufacturer of surfaces to be cleaned.

b) Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

PART 3: EXECUTION

3.1 Execution during Construction

a) The Contractor shall provide suitable containers and locate on site for collection of waste materials, rubbish, and debris.

b) The Contractor shall not allow mud, earth droppings and dust from movement of vehicles to accumulate for more than one half day before removal from paved areas. At no time shall any accumulation be allowed which will create a hazard to safety or bad public relations.

PART 4: FINAL CLEANING

4.1 Final Cleaning

a) At completion of construction and just prior to acceptance, the Contractor shall conduct a final inspection of the site. The Contractor shall remove grease, oil, dirt, stains, and other foreign materials within contract limits that are not part of the finished construction.

b) The Contractor shall repair, patch and touch up any marred surfaces to match adjacent finishes.

END OF SECTION 01600

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section 01300: "Submittals".
2. Division 1 Section 01770: "Closeout Procedures"

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning Work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of all elements to remain and to be demolished. Verify all salvageable material with the Owner.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for Work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine floors and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

2.2 PREPARATION

A. Existing Utility Information: Obtain information necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Do not proceed with utility interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

2.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly. Architect is not responsible if descrepancies are noted by the Contractor but are not reported to the Architect prior to construction.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each stage of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify the Architect when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Owner.

E. Use of Architect's CAD drawings is at Contractor's own risk. Architect is not responsible if discrepancies are discovered but not reported.

F. The Contractor shall demolish and replace any work that does not meet the intentions of the drawings or that has unresolved discrepancies that are not brought to the Owner's attention prior to construction.

2.4 FIELD ENGINEERING

A. Identification: Existing benchmarks, control points, and property corners are noted in the drawings.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

2.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Conditions include but are not limited to maintaining minimum subgrade compaction density standards for soccer field construction. The contractor shall provide compaction and density certifications that verifies the installed soccer field complies with minimum density standards. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Landscape Architect.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

2.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with current requirements in National Fire Protection Association (NFPA) 241 for removal of combustible waste materials and debris.
2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period to the extent possible for normal events.

2.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If required, a factory-authorized service representative shall inspect field-assembled components and equipment installation.

2.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

2.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 01700

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Project Record Documents.
   3. Operation and maintenance manuals.
   4. Warranties.
   5. Instruction of Owner's personnel.
   6. Final cleaning.

B. Related Sections include the following:
   1. Division 1 Section 01320: "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
   2. Division 1 Section 01700: "Execution Requirements" for progress cleaning of Project site.
   3. Divisions 2 for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit 2 copies of specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit 2 copies of Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
   6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   8. Submit changeover information related to the Owner's occupancy, use, operation, and maintenance.
   9. Complete final cleaning requirements, including touchup painting.
   10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
   11. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Designer will either proceed with inspection or notify Contractor of unfulfilled requirements. Designer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by the Designer, that must be completed or corrected before certificate will be issued.
   1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Submit a final Application for Payment according to Division 1 requirements.
   2. Submit certified copy of Designers Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Designer and Construction Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Designer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit (3) three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Owner
      d. Name of Contractor.
      e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Owner's reference during normal working hours.

B. Record Drawings: Maintain and submit one original and one copy of blue- or black-line white prints of Contract Drawings and Shop Drawings.
   1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
      a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
      b. Accurately record information in an understandable drawing technique.

c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.

2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit (2) copies of Project's Specifications, including addenda and contract modifications. Mark copies to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders, Record Drawings, where applicable.

D. Miscellaneous Record Submittals: Assemble (2) copies of miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Assemble two (2) complete sets of operation and maintenance data indicating the operation and maintenance of each piece of equipment. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Maintenance Data:
a. Manufacturer's information, including list of spare parts.
b. Name, address, and telephone number of Installer or supplier.
c. Maintenance procedures.
d. Maintenance and service schedules for preventive and routine maintenance.
e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 WARRANTIES

A. Submittal Time: Submit written warranties on request of Owner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. Instruction: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Provide instruction at mutually agreed-on times.
   2. Schedule training with Owner with at least 10 days' advance notice.

B. Develop an instruction session that includes training for all equipment as required by individual Specification Sections. Include instruction for the following:
   1. Review of documentation.
   2. Adjustments.
   3. Maintenance.
   4. Repair.

3.2 FINAL CLEANING

A. Cleaning: Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
      c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface and apply a layer of mulch.
      d. Remove tools, construction equipment, machinery, and surplus material from Project site.
      e. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      f. Remove labels that are not permanent.

g. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

h. Leave Project clean and ready for occupancy.

B. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

PART 4: GUARANTEE

A. Neither the final certificate of payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

B. The Contractor shall remedy any defects in the Work, and pay all expenses for any damage to other Work resulting there from, which shall appear within a period of one (1) year from the date of final acceptance of the work unless a longer period is specified elsewhere. The Owner shall give notice of observed defects with reasonable promptness. Mechanical equipment that carries a manufacturer's warranty will be considered guaranteed for the extent of the warranty only.

C. The Contractor shall submit to the Owner's Representative, before final acceptance, two (2) copies of all warranties, guaranties, and surety bonds on the Work, as required in the Contract Documents. All such documents shall show the name of the Project, location, and name of the Owner.

END OF SECTION 01770

SECTION 02210 – EARTHWORK FOR SITE

PART 1 - GENERAL

All construction shall conform to the requirements and dimensions on the construction plans.

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specifications Sections apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Preparing and grading sub-grades for slabs on grade, walks, pavements, and landscaping.
2. Sub-base course materials for walks and pavements.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 2 Section "Erosion and Sedimentation Control" for required measures prior to earthwork operations.
2. Division 2 Section "Lawns and grasses" for finish grading, including placing and preparing topsoil for seeding.
3. Division 2 Section "Concrete Paving" for concrete footings, pavements, curbing, walkways, and retaining walls.

1.3 DEFINITIONS

A. Excavation consists of the removal of material encountered to sub-grade elevations and the reuse of materials removed or the removal to designated areas of surplus suitable material.

B. Subgrade is the uppermost surface of an excavation or the top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

C. Borrow is soil material obtained when sufficient approved soil material is not available from excavations.

D. Sub-base Course is the layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.

E. Base Course is the layer placed between the sub-base and surface pavement in a paving system.

F. Drainage Fill is a course of washed granular material supporting slabs-on-grade placed to cut off upward capillary flow of pore water.

G. Unauthorized Excavation consists of removing materials beyond indicated sub-grade elevations or dimensions without direction by the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.

1.4 EXISTING CONDITIONS

A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided or arrangements suitable to the Owner have been made.

B. Contractor to locate all underground utilities prior excavation

PART 2 - MATERIALS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: ASTM D 2487 soil classification groups SW, SP and SM or SM-SC; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter. Satisfactory soil material shall have the following characteristics:

1. Low Plasticity Soil: liquid limit less than 50 and P.I. less than 20
2. Percent passing the 200 sieve: less than 15%
3. Standard Proctor Maximum Dry Density (MDD): 95 percent or greater
4. Moisture Content: within 2 percent of optimum

B. Sub-base and Base Materials: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand with at least 95 percent passing a 1 1/2-inch sieve and not more than 12 percent passing a No. 200 sieve and conforming to ASTM D 2940.

C. Engineered Fill: Sub-base or base materials.

D. Bedding Material: Sub-base materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, coarse aggregate grading size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve and conforming to ASTM D 448.

F. Aggregate Base Course: Aggregate Base Course - ABC - shall meet requirements and specifications of current NCDOT Specifications Manual.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion and sedimentation control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust in accordance with Section 02270 - "Soil Erosion and Sedimentation Control".

3.2 DEWATERING

A. Minimize surface water and subsurface or ground water from entering excavations, from ponding on prepared sub-grades, and from flooding Project site and surrounding area to prevent unsafe conditions.

B. Protect sub-grades and foundation soils from softening and damage by rain or water accumulation.

3.3 EXCAVATION

A. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on project site or using explosives on project site.
   a. Perform blasting without damaging adjacent structures, property, or site improvements
   b. Perform blasting without weakening the bearing capacity of rock sub grade and with the least-practicable disturbance to rock to remain

B. Stability of Excavations: Maintain stable excavations in compliance with all applicable local, state, and federal regulations.

C. Excavation of Unsuitable Soils: Excavate areas of unsuitable soils to the depth as directed by the Geotechnical Engineer.

D. Excavation for Walks and Pavements: Excavate for walks and pavements to indicated elevations, dimensions, cross sections, and grades. Widen excavations to permit placing and removing concrete form work, installing services and other construction and for inspections. Trim sub-grades to required lines and grades to leave solid base to receive other work.

E. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until Engineer has classified it. The

Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

a. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
    i. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified, as rock excavation is earth excavation.
b. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
    i. 18" outside concrete forms other than at footings.
    ii. 12 inches outside of concrete forms at footings
    iii. 6 inches outside of minimum required dimensions of concrete cast against grade
    iv. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    v. 6" beneath bottom of concrete slabs on grade
    vi. 6" beneath pipe in trenches, and the greater of 24 inches wider than pipe 42 inches wide.

F. Excavation for utility trenches
a. Excavate trenches to indicated gradients, lines, depths, and elevations.
b. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
c. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub grade.
    i. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, carefully excavate trench bottoms and support pipe and conduit on an undisturbed sub-grade.
    ii. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference.
    iii. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
d. Trench bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
    i. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.4 STORAGE OF SOIL MATERIALS

A. Store excavated and borrow soil materials acceptable for backfill and fill in shaped, graded, and drained stockpiles. Locate stockpiles away from edge of excavations. Provide measures that prevent water or wind erosion and displacement of stockpile areas when remaining stockpiled for a period of more than 30 working days. Available stock piled areas are to be determined upon acceptance of alternates.

3.5 BACKFILL

A. Backfill excavations promptly following:

1. Acceptance of construction below finished grade including, where applicable, damp-proofing, waterproofing, and perimeter insulation.
2. Surveying of underground utility inverts and inlet elevations for record documents.
3. Testing, inspection, and approval of underground utilities. (coordinate and schedule owner's testing consultant)
4. Removal of concrete form work.
5. Removal of trash and debris from excavation.
6. Removal of temporary shoring and bracing, and sheeting.
7. Utility Trench Backfill:

3.6 FILL

A. Preparation:

1. When sub-grade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil, and re-compact to required density.
2. Place fill materials in layers of the specified thickness to required elevations as shown on the construction drawings.

B. Moisture Control: Prior to compaction, uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
3. Stockpile or spread and dry removed wet satisfactory soil material.

C. Compaction: Place backfill and fill materials in layers not more than 8 to 10 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Place evenly on all sides and along the full length of structures and utilities to required elevations.

1. Moisture content at compaction shall be -2% to +2% of Optimum Moisture Standard Proctor MDD.
2. Compact fill material to not less than the following percentages of maximum dry density according to ASTM D 698:
   a. 95% under paved walking surface
   b. 98% under vehicular surface

D. Under Walks and Pavements: Compact each layer of backfill or fill material, except the top 12 inches to 95 percent of Standard Proctor MDD. Compact the top 12 inches to 98 percent Standard Proctor MDD.

E. Around and above utility services:

F. Under Lawn or Unpaved Areas: Compact the top 6 inches below sub-grade and each layer of backfill or fill material to 90 percent.

3.7 GRADING

A. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Provide a smooth transition between existing adjacent grades and new grades.

C. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

D. Slope grades to direct water away from buildings and to prevent ponding.

E. Finish sub-grades to required elevations and within the following tolerances:

F. Lawns and unpaved areas: Plus or minus 0.10 feet.

G. Walks: Plus or minus 0.10 feet.

H. Pavements: Plus or minus 0.05 feet.

I. Within building lines: 1/2 inch when tested with a ten foot straightedge.

3.8 SUBBASE AND BASE COURSES

A. Install base and reference according to the following:

1. Under building slabs: See Section 02210
2. Under footings and foundations: See Section 02210
3. Under steps and ramps: Use sub-base material.
4. Under walks: Use satisfactory excavated or borrow soil material.
5. Under grass and landscape areas: Use satisfactory excavated or borrow soil material.
6. Under Pavements: Place aggregate base course material on prepared sub-grade. Compact base course at optimum moisture content to required grades, lines, Refer to section 02210, 3.6C for compaction requirements
7. Shape base to required crown elevations and cross-slope grades.
8. When thickness of compacted base course is 6 inches or less, place materials in a single layer. When thickness exceeds 6 inches, place material in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

9. Pavements shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders at least 12 inches wide of acceptable soil materials and compact simultaneously with each base layer.

3.9 DRAINAGE FILL

A. Refer to Playing field earthwork specification.

3.10 FIELD QUALITY CONTROL

A. Testing of the compacted backfill will be of the following types:

1. Field in-place density tests according to ASTM D 1556 (Sand cone method), ASTM S 2167 (rubber balloon method), or ASTM D 2937 (drive cylinder method), as applicable.
2. Building Slab and Pavement Areas: At sub-grade and at each compacted fill and backfill layer, at least one field in-place density test for every 2,000 sq. ft. or less of paved area, but in no case fewer than one tests.

3.11 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Contractor shall Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or loosely compacted. Scarify or remove and replace material, reshape and re-compact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.

3.12 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property. Remove surplus satisfactory soil material and topsoil and place on Owners property as directed. If all topsoil cannot be displaced on site the contractor shall haul excess topsoil to a suitable destination.

END OF SECTION 02210

PART 1 - GENERAL

All construction shall conform to the requirements and dimensions on the construction plans, Engineer's Design and Construction Standards, and applicable codes of the City.

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Seeding.
2. Sodding.

B. Related Sections include the following:
1. Division 2 Section – 02210 Earthwork for Site for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Sub-grade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certification of Grass Seed: From seed vendor for each grass-seed mono-stand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turf-grass sod, identifying source, including name and telephone number of supplier.

C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Planting Schedule: Indicating anticipated planting dates for each type of planting.

G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turf-grass Sod Materials" and "Specifications for Turf-grass Sod Transplanting and Installation" in its "Guideline Specifications to Turf-grass Sodding."

1.7 SCHEDULING

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 60 days from date of Substantial Completion.

a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

2. Sodded Lawns: 30 days from date of Substantial Completion.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height:

1. Mow grass 2 to 3 inches high.

E. Lawn Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species, as follows:

C. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Rebel II Fescue:

a. 25'1 Olympic.
b. 25'1 Ario.
c. 25'1 Bonanza.
d. 25'1 Rebel II.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Certified, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species:

1. General Grass Species for Site Sodding: Rebel Fescue.

C. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

2.3 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1/2 inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
2. Provide lime in form of dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

G. Sand: Clean, washed, natural or manufactured, free of toxic materials.

H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.5 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 10 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

2.8 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. Sod and Seed Areas:
   a. Triangle Landscape Supplies TLS-1 Soil Conditioner. Phone # (919) 553-1118 or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Soil preparation work shall only be performed while existing soil and amendments are dry. No work shall be performed under wet conditions.

B. Soils shall be thoroughly mixed and tilled with tractor driven PTO tiller unless impossible due to space constraints. In confined areas heavy-duty manual tiller will be used.

C. Soil preparation for:

1. Sod and Seed Areas:

a. Amend existing topsoil as follows:
   1) Thoroughly roto-till, pulverize and break up existing topsoil and subsoil to a minimum depth of 4" while dry.
   2) Remove debris, gravel, rock and other deleterious material over 1/2" in diameter within 4" of surface of lawn areas from the project site.
   3) Spread soil mix 2" evenly over previously tilled dry topsoil, and retill in to a depth of 2" over entire plant bed.
   4) Rake out any debris, gravel, rock, or other deleterious material over ½ inch in diameter that may have been introduced after retilling.

3.3 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with asphalt-emulsion tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry application at a minimum rate of 500-lb/acre dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb/acre.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.5 SATISFACTORY LAWNS

A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and free of any bare spots not exceeding 5 by 5 inches.

B. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

C. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION

PART 1 - GENERAL

This project's erosion control requirements will be issued by the North Carolina Department of Environmental and natural resources for land disturbance. The extent of major erosion and sediment control measures will be illustrated and permitted through the office of the Vendor. The Project General Contractor must adhere to the approved sequence of construction and installation of erosion control measures as detailed and approved by this State Permit. The Contractor shall be responsible for monitoring the effectiveness of erosion control measures, repairing, replacing or modifying the control measures as required to effectively control siltation and erosion, including the protection of public rights-of-way and points of storm water discharge. DEVIATION from the Approved Erosion Control Plan must be review by the Vendor's Engineer of record and NCDENR, Land Quality Section review authorities.

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specifications Sections apply to this Section.

B. The North Carolina Sedimentation Pollution Control Act of 1973 (latest edition) shall apply to this Section.

C. The North Carolina Erosion and Sediment Control Planning and Design Manual shall apply to this Section.

1.2 SUMMARY

A. This section includes provisions for the installation and maintenance of erosion and sedimentation control devices.

1.3 DEFINITIONS

A. Temporary Erosion and Sedimentation Control Devices: These measures shall be installed prior to construction and maintained for the duration of construction activities. Following the installation of permanent erosion and sedimentation measures, temporary measures shall be removed. Examples of temporary devices include sediment fence, block and gravel inlet protection, and sediment traps.

B. Permanent Erosion and Sedimentation Control Devices: These measures shall be installed following completion of all construction in any given area. Examples of permanent devices include Riprap channels and aprons, and seeding.

1.4 QUALITY ASSURANCE

A. The laws governing erosion and sediment control are performance oriented; therefore, the Contractor shall be prepared to alter erosion control measures that fail to effectively control erosion and sedimentation and provide additional measures as needed and directed by the

Owner/Engineer/County of Durham.

PART 2 - MATERIALS

A. Permanent Seed: Permanent Seeding shall conform to, "Lawns and Grasses".

B. Temporary Seed: Use certified seed inspected by the North Carolina Crop Improvement Association and bearing an official "Certified Seed" label.

December 15 - April 15:	Apply blend of 120#/Ac. Rye (grain) and 50#/Ac. Kobe Lespedeza.
April 15 - August 15:	Apply 40#/Ac. German Millet.
August 15 - December 15:	Apply 120#/Ac. Rye (grain)

C. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.

D. Fertilizer: Provide fertilizer with percentage of nitrogen required to provide not less than 1 pound of actual nitrogen per 1,000 square feet of surface area, and not less than 4 percent phosphorus and 2 percent potassium. Provide nitrogen in a form that will be available to grass during initial period of growth. At least 50 percent of nitrogen shall be organic form.

E. Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats, or barley at a rate of 70 to 90 pounds per 1000 square feet.

F. Mulch Binder: Asphalt emulsion sprayed at a rate of 10 to 13 gallons per 1000 square feet.

G. Mulch Nettings: Lightweight plastic, cotton, jute, wire, or paper nets with anchoring staples.

H. Riprap: Well-graded mixture of hard, angular stone with 50% by weight larger than the specified size. The diameter of the largest stone size shall be 1.5 times the d50 size with smaller sizes grading down to 1 inch. Classes and specifications of Riprap are as follows:

Class 1: 5 to 200 lbs. gradation with 30% weighing a minimum of 60 lbs. each and no more than 10% weighing less than 15 lbs. each.

Class 2: 25 to 250 lbs. gradation with 60% weighing a minimum of 100 lbs. each and no more than 5% weighing less than 50 lbs. each.

Class A: 2-inch to 6-inch diameter stone sizes with 10% tolerance between top and bottom sizes, equally distributed with no specified gradation.

Class B: 5-inch to 15-inch diameter stone sizes, equally distributed with no specified gradation.

I. Gravel Filter: Well graded gravel or sand gravel layer(s) 6 inches thick of the aggregate gradation specified on the drawings.

J. Filter Blanket: 20 to 60 mils thick with a grab strength of 90 to 120 lbs. conforming to ASTM D 1682 or ASTM D 177 with no less than 4% open area and an equivalent opening size as specified but no less than U.S. Standard Sieve No. 100.

K. Inlet Protection Concrete Masonry Unit: 8-inch by 8-inch by 16-inch nominal size hollow load-bearing concrete blocks conforming to ASTM C 90, Grade N, and net area compressive strength of 1900 psi.

L. Inlet Protection Gravel: #57 washed stone.

M. Sediment Basin Filter: Class B Riprap and #5 washed stone of the quantities and arrangement indicated.

N. Sediment Fence Filter Fabric: Synthetic filter fabric or pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn certified by the manufacturer as conforming to the following minimum requirements: 85% filtering efficiency, 30 lbs./in in tensile strength at 20% elongation, and 0.3 gals/sq. ft./min. slurry flow rate.

O. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120 degrees F.

P. Sediment Fence Post: 1.33 lb./L.F. steel with a minimum length of 4 feet with projections to fasten filter fabric.

Q. Sediment Fence Wire Mesh: 14 gauge wire with maximum spacing of 6 inches.

R. Stabilization Gravel: 6-inch thick course of Aggregate Base Course as specified in NCDOT "Standard Specifications for Roads and Structures".

PART 3 – EXECUTION

3.1 CONSTRUCTION SPECIFICATIONS

A. Surface Roughening: Roughen areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of any such tillage implement on the contour. Make grooves formed by such implements less than 10-inches apart and not less than 1-inch deep.

B. Limit roughening with tracked machinery to sandy soils to avoid undue compaction of the soil surface. Operate machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

C. Temporary Gravel Construction Entrance/Exit: Remove vegetation, roots, and other unacceptable materials and properly grade the construction entrance/exit area. Place the gravel to the depths and dimensions indicated on the plans and smooth the surface.

D. Temporary Seeding: Prepare seedbed to a well-pulverized, loose, and uniform surface. Apply lime and fertilizer to the soil and mix to a depth of 4 to 6 inches. Apply seed evenly to soil using a broadcast seeder, drill, cultipacker seeder, or hydroseeder at the rates specified. Broadcast seed shall be covered by raking or chain dragging and then lightly firmed with a roller or cultipacker. Small grain seeds should be planted no more than 1-inch deep, grasses and legumes no more than 1/2-inch deep. All areas shall be mulched following seeding.

F. Permanent Seeding: See Section 02920, "Lawns and Grasses".

G. Mulching: Apply mulching following seeding of exposed areas except under the following methods:

1. Seed is combined with a hydroseeder slurry containing wood fiber mulch.
2. A hydroseeder slurry is applied over straw.

H. Application of Organic Mulch: Spread mulch uniformly, by hand, or with a mulch blower. When hand spreading, divide the area into sections of 1000 sq. ft. to facilitate uniform distribution. No more than 25% of the ground surface shall be visible following mulching.

I. Anchoring Organic Mulch: Immediately anchor straw mulch following spreading by one of the following methods:

1. Mulch Anchoring Tool: Operate the machinery on the contour.
2. Liquid Mulch Binder: Apply uniformly except at edges of areas and at ridges or crests where a heavier application is required to prevent displacement due to wind. Binder may be applied together with the mulch material.
3. Mulch Nettings: Apply over the mulch. Start laying the netting from the top of channels and slopes and proceed downhill. Allow netting to lay loosely but without wrinkles - do not stretch. To secure the net, bury the uphill end in a slot or trench to a depth of 6 inches. Staple the net every 12 inches across the top end and every 3 feet along the edges, along the bottom end and down the center. Edges of netting shall be overlapped a distance of 3 inches and stapled together. Do not stretch the net when applying staples. To join ends of netting, bury the downhill netting in a 6-inch deep slot or trench and overlap the uphill netting a distance of 18 inches. Staple the nettings together every 12 inches just below the slot or trench.

J. Riprap Placement: Prepare the subgrade by removing all vegetation and other unacceptable materials and cutting to a depth that allows placement of the Riprap at the finished grade of the surrounding area. Place the gravel filter or filter blanket upon the prepared subgrade as follows:

1. Gravel Filter: Spread gravel in a uniform layer to the depth specified. Where more than one layer is required, minimize mixing of the layers.

2. Riprap: Placement of the Riprap shall proceed following installation of the filter. A dense, well-graded mass of stones with a minimum of voids shall be formed. Place Riprap to its full thickness in one operation. Do not place by dumping through chutes or in other ways that cause segregation of stone sizes. Take care not to dislodge the filter material. The finished slope should be free of pockets of small stone or clusters of large stone. Hand placing may be necessary to achieve the proper distribution of stone sizes. The finished surface of the Riprap shall blend with the surrounding grade. No overfall or protrusion shall be apparent.

K. Temporary Diversions: Remove vegetation, roots, and other unacceptable materials and grade to the cross section shown on the plans. Provide sufficient room around diversion to permit machine regrading and cleanout. Immediately vegetate the ridge of the dike after construction if diversion will remain beyond 30 working days.

L. Grass-lined Channel: Remove vegetation, roots, and other unacceptable materials and excavate and shape channel to dimensions and grades shown on the plans. Grade a 0.2-ft overcut around the channel perimeter to allow for bulking during seedbed preparation. Remove and dispose of all excess soil so that surface water may enter the channel freely. Protect the channel with a mulch or temporary liner to control erosion during the grass establishment period.

M. Riprap Apron: Remove vegetation, roots, and other unacceptable materials and excavate and shape area to dimensions and grade of the soil foundation shown on the plans. Prepare subgrade and place filter blanket and Riprap as specified herein under "Riprap Placement." The minimum thickness of the Riprap shall be 1.5 times the maximum stone diameter. Construct the apron on zero grade with no overfall at the end. Install the top of the Riprap at the downstream end level with the receiving area or slightly below it. Ensure that the apron is properly aligned with the pipe and straight throughout its length. After construction, immediately vegetate all disturbed areas.

N. Block and Gravel Inlet Protection: Excavate the soil around the inlet 2 inches below the top of the inlet and place the bottom row of concrete blocks against the inlet to provide lateral support. Lay concrete blocks in bottom row on sides too allow for drainage through the structure. Place second row of concrete block on top of bottom row. Install wire mesh with 1/2- inch openings over all block openings to prevent gravel from passing through block openings. Place gravel against wire to a height of 2-inches below top of concrete blocks as depicted on the plans.

O. Temporary Sediment Trap: Remove vegetation, roots, and other unacceptable materials from sediment trap area. Ensure that fill material for the embankment is free of organic or other objectionable materials. Place fill in lifts not to exceed 9 inches and machine compact. Over fill the embankment 6 inches to allow for settlement. Clear the sediment pit below the elevation of the crest of the spillway to facilitate sediment cleanout. Construct the spillway section as shown on the plans. Place a filter blanket between the Riprap and soil. Extend the blanket across the spillway foundation and sides to the top of the dam. Construct the spillway so that the bottom of the stone filter is a minimum of 3 feet. Place the stone filter and work the smaller stones into the voids of the larger stones. Install the weir at a minimum of 3 feet from the bottom of the sediment pit and level to ensure design capacity. Ensure that the stone extends downstream past the toe of the embankment until stable conditions are reached. Keep the edges of the stone outlet flush

with surrounding grade and shape the center to confine the outlet flow. Stabilize the embankment and all disturbed areas above the sediment pool and downstream from the outlet immediately following construction. Mark the distance from the top of the spillway to the sediment cleanout level in the field.

P. Sediment Fence: Construct sediment fence no more than 18 inches above grade. Install posts at a minimum depth of 18 inches below grade. Excavate a trench 4 inches wide by 8 inches deep along the upslope side of the post line. Fasten mesh to posts using heavy duty staples at least 1-inch long or tie wires and extend to bottom of trench. Attach filter fabric to wire mesh and extend to bottom of trench. Work from a continuous roll to avoid joints. When joints are necessary, secure filter fabric at support post and install next piece at previous post to provide overlap. Backfill the trench with compacted soil or gravel placed over the mesh and filter fabric.

Q. Construction Road Stabilization: Clear road bed of vegetation, roots, and other unacceptable materials. Road construction should follow along contour if possible. Locate parking and storage areas on the flatter areas of the site if possible and maintain positive drainage. Divert excess runoff to stable areas by way of temporary diversions as specified herein. Keep cuts and fills at 2:1 or flatter. Spread a 6-inch course of "ABC" crushed stone evenly over the full width of the roadbed and smooth. Employ geotextile fabric or subsurface drains in areas where seepage or seasonal wetness is encountered. Vegetate all roadside ditches, cuts, fills, and other disturbed areas remaining in place for a period of 30 or more working days.

R. Check Dam: Place filter fabric and stone to the lines and dimensions shown on the plans. Keep the center stone section 9 inches below grade at the top of the channel banks. Extend stone at least 18 inches beyond the top of the channel banks to keep overflow water from undercutting the dam as it re-enters the channel. Set spacing between dams such that the top of the lower dam and toe of the upper dam are at the same elevation. Protect the channel downstream from the lowest dam with a Riprap apron as specified herein. Ensure that the channel reach above the uppermost dam is stable. Ensure that culverts interfacing with the channel are not blocked by the check dams or displace stones.

3.2 MAINTENANCE

A. General: The Contractor shall be responsible for maintenance of all temporary erosion and sediment control measures during construction operations and until installation of permanent control measures.

B. Erosion and Sediment Control measures shall be installed and maintained to sufficiently retain sediment within the boundaries of the site. All surfaces shall be non-erosive and stable within 30 working days or 120 calendar days after completion of the construction activities, whichever period is shorter.

C. Temporary Gravel Construction Entrance/Exit: Maintain the gravel pad in a condition to prevent mud or sediment from leaving the site. This may require topdressing with 2-inch stone.

D. Temporary Seeding: Re-seed and mulch areas where seedling emergence is poor or where erosion occurs. Do not mow. Protect from traffic as much as possible.

E. Permanent Seeding: See Section 02920 "Lawns and Grasses".

F. Mulching: Inspect all mulches periodically and after rainstorms to check for rill erosion, displacement, or failure. Where erosion occurs, apply additional mulch. If washout occurs, repair the grade, re-seed in seeded areas, and reinstall mulch.

G. Riprap: Inspect periodically for scour or dislodged stones.

H. Temporary Diversions: Inspect once a week and after every rainfall. Remove sediment from the flow area and repair the diversion ridge.

I. Grass-lined Channels: During the establishment period, check grass-lined channels after every rainfall. Make repairs to eroded soils. Check the channel outlet for bank stability and evidence of scouring. Remove all significant sediment accumulation. After grass emerges, routinely inspect and nurture the grass until a healthy and vigorous stand is established to provide optimum erosion control.

J. Block and Gravel Inlet Protection: Inspect after each rainfall and remove sediment to provide adequate storage volume for subsequent rainfall event.

K. Temporary Sediment Trap: Inspect after significant rainfall. When sediment has accumulated to one-half the depth of the trap, remove the sediment and restore trap to its original lines and dimensions. Replace contaminated parts of the spillway's gravel facing. Periodically check to ensure the top of the spillway is 1.5 feet below the top of the embankment. Fill any settlement of the embankment back to its specified height. Replace dislodged Riprap from the spillway.

L. Sediment Fence: Inspect once a week and after each rainfall and replace damaged, collapsed, or disconnected fabric. Remove significant sediment accumulations. Take care to keep from undermining the fence during cleanout.

M. Construction Road Stabilization: Inspect construction roads and parking areas periodically and top dress with new gravel as needed. Check road ditches after significant rainfall for erosion and deposits of sediment. Repair and remove sediment as needed to ensure effective drainage.

N. Check Dam: Inspect after each rainfall event and check for scouring along edges of the dam. Repair damages and remove significant accumulations of sediment behind the check dam. If substantial erosion occurs between dams, install a Riprap liner in that portion of the channel as specified herein under "Riprap Channel". Replace dislodged stones and add stone as needed to maintain specified height of check dam.

O. Clean and Repair Storm Drainage System: Maintain inlet protection at all storm drain entrances. If pipes become silted, remove silt or replace pipe prior to removal of temporary sedimentation control facilities. Pipes and structures, including Riprap channels and aprons, shall be free of mud, silt and debris prior to inspection by Engineer and acceptance by Owner.

END OF SECTION 02270

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide labor, materials, equipment and services to complete the Portland Cement Concrete Paving work, as indicated on the drawings, as specified herein or both.

B. Including but not necessarily limited to the following:

1. Fill, subgrade, and lime rock base
2. Concrete formwork
3. Concrete reinforcement
4. Expansion and contraction joints
5. Concrete paving

1.02 RELATED WORK

A. Section 02210 – Earthwork for site

1.03 SUBMITTALS

A. Shop Drawings: Provide shop drawings, showing pattern and control construction, and expansion joints.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.

1.05 JOB CONDITIONS

A. Allowable concrete temperatures:

1. Hot Weather: Maximum 90°F as per ASTM C-94.
2. Cold Weather Minimum 40degrees and rising.

B. Do not place concrete during rain, unless protection is provided.

PART 2 - PRODUCTS

2.01 FILL

A. As specified in Section 02210 - Earthwork.

2.02 COMPACTED SUB-BASE

A. As specified in Section 02210 - Earthwork.

2.03 READY-MIXED CONCRETE

A. Concrete Materials

1. All concrete work of this section shall contain five (5) percent to seven (7) percent entrained air and shall be air entrained with "Air-Mix" air entraining agent made by Euclid Chemical Company or approved equal made by Master Builders or Grace. Agent shall conform to ASTM C260 and shall be mixed with concrete in accordance with manufacturer's instructions.

B. Concrete Mix, Design and Testing (Testing by Owner): Comply with applicable requirements for concrete mix design, sampling and testing, and quality control, and as herein specified. Design the mix to produce standard-weight concrete consisting of portland cement, aggregate, air-entraining admixture and water to produce the following properties:

1. Compressive strength: Varies – See plans for actual compression strength, with a water cement ratio not to exceed 0.45 by weight
    a. Unless noted on plans concrete compressions shall be 2500 PSI Min.
2. Slump range: Two (2) to Four (4) inches.
3. Air Content: Five (5) to seven (7) percent
4. Aggregate shall conform to ASTM C33, and as follows:
    a. Coarse aggregate shall be 1 inch to #4 ASTM size 67, grey granite, known as "Grey Stone" or approved equal.
    b. Fine Aggregate: ¼ - ½" angular Natural buff color aggregate, or approved equal.
5. Testing Frequency: Test: Once every 100 yds. of poured concrete as determined by the owner's representative. (Not to exceed 7 tests.)

2.04 REINFORCEMENT

A. Provide welded wire mesh conforming to ASTM A185, 6" x 6", ten (10) gauge.

2.05 FORMS

A. Provide steel or wood of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

B. Use flexible spring steel forms or laminated boards to form radius bends.

2.06 EXPANSION AND CONTRACTION JOINTS

A. Gasket: 3/4 inch thick x 4 inch wide nominal treated southern yellow pine where used in continuous runs of concrete sidewalks, as well as, minimum 3/8" asphaltic impregnated fiberboard as per ASTM D-1751.

B. Sealant: Where sealant is noted herein to occur above gasket, provide a two (2) part polyurethane sealant complying with Fed. Spec. TT-S-00227, Class B, Type II, self leveling, designed for pedestrian traffic, equal to "HPL" made by Tremco, or approved equal made by Mameco or Pecora.

C. Backing rod for sealant shall be "Ethafoam 180" made by Dow Chemical Co. or approved equal.

Physical Properties†	**Test Method**	**Direction**	**Value**
Density	ASTM D3575, Suffix W, Method B; ISO 845		**pcf (kg/m3)** 1.8 (28.8)
Compression Set (50% compr.);	ASTM D3575, Suffix B	Vertical	< 20%
(23°C, 25% compr.)	EN/ISO 1856		< 10%
Compressive Creep (1000 hrs @ 73°F [23°C])	ASTM D3575, Suffix BB	Vertical	< 10% @ 2.0 psi (13.8 kPa)
Compressive Deflection	ASTM D3575, Suffix D	Average	**psi (kPa)**
@ 10%			5 (30)
@ 25%			7 (48)
@ 50%			15(103)
Thermal Stability	ASTM D3575, Suffix S; ISO 2796		< 1.5% < 2%
Thermal Conductivity	ASTM D3575, Suffix V; EN 28301; ISO 2581	Vertical	**BTU•in/hr•ft2•°F (W/m°K)**
@ 75°F (24°C)			0.49 (0.07)
@ 23°F (-5°C)			0.42 (0.06)
Water Absorption	ASTM D3575, Suffix L; ISO 2896; ASTM C272		**lb/ft2 (kg/m2)** 0.3 (1.5)
< 3% by volume			
Buoyancy	ASTM D3575, Suffix AA		**pcf (kg/m3)** 58 (930)
Tensile Strength @ peak	ASTM D3575, Suffix T; ISO 1798	Average	**psi (kPa)** 31 (215)

Tensile Elongation	ASTM D3575, Suffix T; ISO 1798	Average	50%
Tear Strength	ASTM D3575, Suffix G	Average	**lb/in (N/mm)** 10 (1.75)

†The data presented for this product are for un-fabricated ETHAFOAM polyethylene foam products. While values shown are typical of the product,

2.07 CURING

A. Cure concrete with standard water soluble dissipating curing compound. Curing compound conforming to ASTM C309 and Fed. Spec. TT-C-800A.

2.08 WATER REDUCING MIXTURE

A. Provide "Eucon WR-75" water reducing and densifying admixture, as manufactured by the Euclid Chemical Company or equal made by Master Builders, Grace or approved equal. The admixture shall conform to ASTM C494, Type A, and not contain any lignosiliconates nor more than one (1) percent chloride ions.

PART 3 - EXECUTION

3.01 BARRICADES

A. Provide temporary barricades around areas of operation and maintain until work under this section is completed and approved.

B. Install temporary traffic, markers, signals, and signs to:

1. Eliminate potentially hazardous conditions.
2. Maintain adequate traffic patterns free of conflict with work under this Contract.

3.02 PREPARATION OF SUBGRADE

A. Bring subgrade to required elevations.

B. Fill soft spots and hollows with additional fill.

C. Level and compact subgrade, to receive rock base for concrete walks, curbs and gutters, to 100% compaction per AASHTO T-180.

3.03 PLACEMENT OF COMPACTED SUB-BASE

A. Place and level rock base over prepared subgrade to a compacted depth indicated on drawings, true to lines and levels. Compact to 98% compaction per AASHTO T-180.

B. During concrete placement, keep receiving surface sufficiently moist to prevent excessive absorption of water from freshly placed concrete.

3.04 FORMWORK

A. Design, construct, and remove for safety of formwork and shoring.

B. Provide forms to shape, lines and dimensions of members shown: substantial, tight enough to prevent leakage, and properly braced or tied to maintain position and size, form sides and bottoms of members.

C. Fill voids of plywood joints with sealant and tool smooth.

D. Form vertical surfaces to full depth and securely position to required lines and levels. Do not place form ties to pass through concrete.

E. Arrange and assemble formwork to permit easy dismantling and stripping, and to prevent damage to concrete during formwork removal.

3.05 REINFORCING

A. Reinforce concrete walks, curbs and gutters. Allow for minimum 2-inch concrete cover.

B. Do not extend reinforcing through expansion and contraction joints. Provide dowelled joints through expansion and contraction joints, with one end of dowels fitted with capping sleeve to allow free movement.

3.06 FORMING EXPANSION AND CONTRACTION JOINTS

A. Space contraction joints at maximum 10' O.C. intervals or as indicated on drawings. Construct weakened plane joints for a depth equal to at least ¼ concrete thicknesses. Make joints of curbs coincide with joints in paving slabs. When sidewalks abut building, provide continuous joint filler.

A. Fit joints with filler of required profiles, set perpendicular to longitudinal axis of walks, curbs and gutters. Recess 1/2 inch below finished concrete surface.

C. Construction Joints: Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than ½ hour, except where such pours terminate at expansion joints. Use standard metal keyway section forms.

D. Expansion Joints:

1. Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch

basins, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

2. Place expansion joints at maximum 30' O.C.
3. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
4. Fillers and Sealants: Apply sealant over expansion joint where occupied space occurs below the walk. Comply with the requirements of Section 02764 for preparation of joints and installation, including priming of joints and backer rod.

3.07 INSPECTION

A. Assure that excavation and form work are completed, and excess water is removed.

B. Check that reinforcement is secured in place. Owner's representative to review items 3.07 A and B prior to pouring concrete

C. Verify that expansion joint material, anchors, and other embedded items are secured in position.

3.08 PREPARATION FOR POURS

A. Notify the Architect and other inspectors at least 36 hours prior to inspection.

B. Equipment forms, and reinforcing shall be clean and wet down, reinforcing firmly secured in place, runways set up and not resting on or displaying reinforcing.

3.09 PLACING CONCRETE

A. Place concrete, screed and wood float surfaces to a smooth and uniform finish, free of open texturing and exposed aggregate.

B. Avoid working mortar to surface.

C. Round edges, including edges of expansion and contraction joints, with 1/2 inch radius edging tool.

D. Where concrete curbs are adjacent to pavement slabs, make concrete curbs and gutters integral with slabs. Make expansion and contraction joints of curbs coincide with slab joints.

E. Do not vary finished surfaces from true lines, levels or grade by more than 1/8 inch in 10 feet when measured with straightedge.

F. Apply curing compound on finished surfaces immediately after placement. Apply in accordance with manufacturer's recommendations.

3.10 CONCRETE FINISHING

A. After consolidating and striking off concrete, level the surface by darbying or bull floating. After the concrete has stiffened sufficiently to permit the operation and the surface sheen has disappeared, the surface shall be floated. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.

B. After floating, test surface for trueness with a ten (10) foot straight edge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slabs, gutters, back top edge of curb, and formed joints with and edging tool, and round to ½" radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.

D. Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by the Owner's representative.

3.12 CURING

A. Protect and cure finished concrete paving, complying with applicable requirements of this Section. Use curing compound specified herein applied in accordance with manufacturer's instructions.

3.13 REPAIRS AND PROTECTION AND COMPLETED WORK

A. Repairs: Where pavement has been cracked or damaged, remove the entire panel wherein the damage occurs and install a new panel of pavement. No patching within a panel is permitted.

B. Protection

1. Protect concrete from damage until acceptance of work. Exclude foot traffic from pavement for at least fourteen (3) days after placement. No construction traffic is permitted.
2. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

C. During curing period, protect concrete from damaging mechanical disturbances, water flow, loading, shock, and vibration.

3.14 CLEAN UP

A. Remove debris and excess material immediately from project site.

B. Take down barricades and temporary traffic markers, signals and signs only after work included in this section is finished and inspected.

C. Leave project area neat, orderly and free of any hazardous conditions.

END OF SECTION 02520

1. 0 GENERAL REQUIREMENTS

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this section.

1.2 Scope of Work

A. Furnish all labor, materials, tools, and equipment necessary to install, in place, all synthetic turf material as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the Manufacturer's written installation instructions, and in accordance with all approved shop drawings.

B. Prior to order of materials, the Synthetic Turf Contractor shall submit the following:

1. Product data, including Independent Laboratory Test Results,
2. Installation details,
3. Sample Warranty,
4. Field layout and striping plans,
5. Details on construction, especially any details that may deviate from plans and specifications.

C. Prior to the beginning of installation, the Synthetic Turf Contractor of the synthetic turf shall verify the base for planarity. Upon written confirmation from the base contractor that compaction/planarity and drainage/permeability specifications have been achieved, the installation of synthetic turf will proceed as arranged.

D. Prior to Final Acceptance, the Synthetic Turf Contractor shall submit to the Owner three (3) copies of Executed Warranty Documents and Maintenance Manuals, which will include necessary instructions for the proper care and preventative maintenance of the synthetic turf system, including painting and striping.

1.3 Shop Drawings

A. Shop drawings shall be prepared at the scale of the construction documents and contain all pertinent information regarding installation. These drawings shall be submitted to the Owner or Owner's representative for approval prior to the manufacturing and shipment of materials.

B. Submit drawings for:

1. Installation details, edge detail, goal post detail, other inserts, and covers, etc., as required by contract.
2. Striping plan showing any field lines, markings and boundaries, and field logos per project drawings.

1.4 Quality Assurance

A. Synthetic Turf Manufacturer's Experience:

1. The Synthetic Turf manufacturer shall have the experience of at least one hundred (100) acceptable installations of full-size fields (minimum 65,000 sq. ft.) in the United States within the past five (5) years of tufted, polyethylene grass-like fabrics that are filled with either all rubber or a mixture of SBR rubber and sand. Submit a list of all applicable installations with the bid.
2. The Synthetic Turf manufacturer shall have the experience of twenty-five (25) acceptable installations (minimum 65,000 sq. ft.) of fields that are at least eight years old. Submit a list of all applicable installations with the bid.
3. The Synthetic Turf Manufacturer shall have the experience of fifty (50) acceptable installations of a monofilament fiber system. Submit a list of all applicable installations with the bid.
4. The Synthetic Turf manufacturer shall have the experience (if applicable to this project specification) of one hundred (100) installations with sewn main fabric seams.
5. The Synthetic Turf manufacturer must be a certified member of the Synthetic Turf Council in good standing.
6. The Synthetic Turf manufacturer must have and operate its own extensive research and development laboratory. This laboratory must include testing devices for the following test criteria: Tuft Bind, Grab Tear, Fiber Elongation, Coefficient of Friction, Coefficient of Traction, Force Reduction, g-Max (shock attenuation), Breaking Strength of Fabric, Applicable Flame Spread and Flammability, etc.
7. The Synthetic Turf manufacturer must have manufactured and installed fields at every level of competition, including high school, college and professional.
8. The Synthetic Turf manufacturer must have at least one current NCAA Division one and one current NFL game stadium installation.
9. The Synthetic Turf manufacturer must be a FIFA licensee and have at least (1) one FIFA 2-Star field installed in the United States.
10. The Synthetic Turf manufacturer must not have had more than (5) five fields replaced, under warranty, during the past 5 years.
11. The Synthetic Turf manufacturer must be vertically integrated including in-house tufting, polyethylene monofilament extrusion, in-house coating, polyurethane compounding, manufacture own primary backing, in-house

yarn texturizing, ability and flexibility to tuft various gauge widths and have the ability to recycle used/old fields.

B. Fiber yarns must be produced from C_8 Ethylene Copolymers.

C. The Primary Backing shall consist of two layers of woven fabric and one layer of non-woven fabric (minimum of (3) three separate backing layers). Primary backing must contain UV stabilizers and must pass 500 hours of QUVA testing.

D. The Secondary Backing of high-grade polyurethane shall be applied to the Primary Backing at 23 oz/yd^2. Secondary Backing adds resistance to water degradation and strengthens grip on fibers. The tuft bind shall be a minimum average of 10 lb-F.

E. The entire backing shall be coated with holes perforated throughout the backing at the Synthetic Turf Manufacturer's recommended interval to allow for drainage. Partially coated backings or latex coating materials shall not be acceptable.

F. Warranty: The Synthetic Turf Contractor shall submit it Manufacturer's Warranty, which guarantees the usability and playability of the synthetic turf system for its intended uses for an eight (8) year period commencing with the date of Substantial Completion.

1. The warranty submitted must have the following characteristics:

a) Must provide full-field coverage for eight (8) years from date of Substantial Completion,
b) Must warrant materials and workmanship,
c) Must warrant that the materials installed meet or exceed the product specifications within manufacturing tolerances,
d) Must have a provision to either repair or replace such portion of the installed materials that are no longer serviceable to maintain a serviceable and playable surface,
e) Must be a Manufacturer's warranty from a single source covering workmanship and all self-manufactured or procured materials,
f) Must not be limited to the amount of annual usage.

1.5 Existing Conditions

A. If the surface on which the new synthetic turf is to be installed is an existing asphaltic/concrete base, the Synthetic Turf Contractor will be responsible for any damage due to negligence to the concrete during removal/installation of the synthetic turf system provided there are no failures below the surface which contribute to the damage. The football goal posts, if any, are to be removed and

reinstalled by the Owner or Prime Contractor to facilitate the installation of the new synthetic turf system.

1.6 Schedule

A. The Synthetic Turf Contractor shall complete all work on the synthetic turf system in accordance with the published project schedule, or as mutually agreed upon.

B. The Synthetic Turf Contractor will require unencumbered use of an area within thirty (30) feet of the synthetic turf area(s) being installed in order to complete his work. The Synthetic Turf Contractor shall also be afforded unencumbered access through the construction site to reach the synthetic turf field area being installed.

1.7 Surface Area

A. The Synthetic Turf Contractor is to verify all measurements.

1.8 Utilities

A. Owner or Prime Contractor will supply necessary water, adequate lighting, and electricity for installation. Owner or Prime Contractor shall permit use of toilet and wash up facilities.

2.0 PRODUCTS

2.1 Materials

A. Fiber shall be monofilament : spinnerette, extruded bi-color (mix of Field Green – three ends, and Olive Green – three ends) multifilament polyethylene. The multifilament fibers shall be tufted in a grass-like fabric to a finished pile height of approximately 2" and coated with a secondary backing of high-grade polyurethane. The synthetic turf fabric shall be filled with 70% ambiently processed SBR rubber and 30% rounded silica sand.

B. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified should be able to withstand full climatic exposure in all climates, be resistant to insect infestation, rot, fungus, mildew, ultraviolet light and heat degradation, and shall have the basic characteristics of flow-through drainage, allowing free movement of surface runoff through the synthetic turf fabric where such water may flow to the existing base and into the field drainage system.

C. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for conventional athletic shoes of all types. The finished surface shall resist abrasion and cutting from normal use. The system shall be suitable for football, field hockey, soccer, lacrosse, baseball, softball, flag football ,PE classes, intramurals, and recreational use.

D. The polyethylene pile yarn shall be a proven athletic caliber yarn designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water, and airborne pollutants. The pile fiber shall possess the following physical characteristics:

	TURF	METHOD
Linear Density (Denier)	10,800	ASTM D 1577
Yarn Thickness	240 microns	ASTM D 3218
Break Strength	25 lb-F	ASTM D 2256
Pile Weight*	40 oz/yd^2	ASTM D 5848

The above specifications are nominal. * Values are +/- 5%.

E. The Pile fabric shall possess the following physical characteristics:

	TURF	METHOD
Finished Pile Height*	2" (51mm)	ASTM D 5823
Product Weight (total)*	71 oz/yd^2	ASTM D 5848
Primary Backing Weight*	8 oz/yd^2	ASTM D 5848
Secondary Coating Weight**	23 oz/yd^2	ASTM D 5848
Fabric Width	15'	ASTM D 5793
Tuft Gauge	1/2"	ASTM D 5793
Grab Tear Strength	> 200 lb-F	ASTM D 5034
Tuft Bind (Avg)*	> 10 lb-F	ASTM D 1335

Except where noted as a minimum or maximum, the above specifications are nominal.
* Values are +/- 5%. **All values are +/- 3 oz/yd^2.

F. Impregnated (Infill) Layer will be 70% ambiently processed SBR rubber and 30% rounded silica sand.

G. Perimeter edge details, underground storm sewer piping and connections, and goal post foundations required for the system shall be as detailed and recommended by the Design Professional, and as approved by the Owner. The cost for these embedded items shall be included in the Sitework Contractor's price along with the compacted, porous base.

3.0 EXECUTION

3.1 General

A. The installation shall be performed in full compliance with approved shop drawings.

B. Only factory-trained technicians skilled in the installation of athletic caliber synthetic turf systems shall undertake the placement of the system.

C. Subject to the requirements in Section 1.2(B), the surface to receive the synthetic turf shall be verified by the Synthetic Turf Contractor as ready for the installation of the synthetic turf system and must be perfectly clean as installation commences and shall be maintained in that condition throughout the process.

3.2 Removal (if necessary)

A. Synthetic Turf Contractor shall remove the existing synthetic turf and under-pad from the field (as required by contract).

B. After removal of the stadium surface, the existing synthetic turf and pad materials shall be rolled up and placed at a location designated by the Owner.

3.3 Installation

A. The completed base and adjacent curbs/perimeter nailer shall be inspected by the Engineer or Sitework Contractor by means of a laser and plotted on a 10-foot grid. Based upon the Contractor's inspection of the topographical survey, the Sitework Contractor shall fine grade the base suitably, including properly rolling and compacting the base to achieve a surface planarity within ¼" in 10-feet (+0, -1/4"). OWNER, ENGINEER, OR PRIME CONTRACTOR SHALL NOT APPROVE THE BASE FOR TOLERANCE TO GRADE WITHOUT OBTAINING THE TOPOGRAPHICAL SURVEY.

B. Subgrade and base shall be uniformly compacted to a minimum of 95% of maximum dry density. Care must be exercised to minimize segregation. Engineer/Sitework Contractor shall make written records available to Synthetic Turf Contractor's inspector for both drainage/permeability and compaction/planarity as obtained from a minimum 10' x 10' grid.

C. The Synthetic Turf Project Superintendent shall thoroughly inspect all synthetic turf materials delivered to the site for both mixing and quantity to assure that the entire installation shall have sufficient material to maintain proper mixing ratios.

D. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Synthetic turf shall be of sufficient length to permit full

cross-field installation. No head or cross seams will be allowed except as needed for inlaid fabric striping or to accommodate programmed cut-outs.

E. All seams shall be flat, tight, and permanent with no separation or fraying. Field seams shall be sewn using double-lock stitch with cord recommended by the Synthetic Turf Manufacturer. Field seams will also be glued (if applicable) to seaming tape. Seaming tape is to be constructed of high tenacity, coated polyolefin. Inlaid markings shall be adhered to seaming tape with a high strength polyurethane adhesive applied per the Synthetic Turf Manufacturer's standard procedures for outdoor applications. All main fabric seams shall be transverse to the field direction (i.e. run perpendicularly across the field).

F. Infill materials shall be properly applied in numerous lifts using special broadcasting equipment to produce a system of recycled SBR rubber particles. The synthetic turf shall be raked and brushed properly as the mixture is applied. The infill material shall be installed to a settled depth of approximately 1-3/8 inches. The infill materials can only be applied when the synthetic turf fabric is dry.

G. *g*-Max (shock attenuation) must test below 125 at installation.

3.4 Field Markings and Decorations

A. Field markings and decorations shall be installed in accordance with approved project shop drawings.

3.5 Clean Up

A. Synthetic Turf Contractor shall provide the labor, supplies, and equipment, as necessary, for final cleaning of the surfaces.

B. The Synthetic Turf Contractor shall keep the area clean and clear of debris throughout the project.

C. Surfaces, recesses, enclosures, etc., shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by Owner.

SECTION 02900 - CHAIN LINK FENCING AND GATES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

The extent of chain link fences and gates is indicated on the drawings.

1.03 SUBMITTALS

Product Data in the form of manufacturer's technical data, specifications, and installation instructions for fencing, fabric, gates and accessories.

1.04 DELIVERY, STORAGE AND HANDLING

Deliver materials to the site in an undamaged condition.

1.05 QUALITY ASSURANCE

Single-Source Responsibility: All like items of materials shall be the products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

1.06 PROJECT CONDITIONS

Protection of Utilities: The Fence Contractor shall locate all utility lines prior to placement of posts. The Fence Contractor will notify the General Contractor on site or the Owner's representative as necessary to assist in the location of utilities. Utility lines that are damaged after being located shall be repaired at the expense of the Fence Contractor.

PART 2 MATERIALS

2.01 General: Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.

A. Fabric: No. 9 gauge (0.148" + 0.005") size steel wires, 2" mesh, 48" high, black with both top and bottom selvages twisted and barbed.

B. Fabric Finish: Galvanized steel wire with black vinyl coating, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.

C. Framing: Black vinyl coated, ASTM A 120, with not less than 2.0 oz. zinc per sq. ft. of surface.

D. Fittings and Accessories: Galvanized, ASTM A 153, with zinc weights per Table 1.

E. End, Corner and Pull Posts: Minimum sizes and weights as follows:

2-5/8" O.D. steel pipe, 9.11 lbs. per linear ft., or 4" x 4" roll-formed sections, 6.56 lbs. per linear ft.

F. Line Posts: Space 10' O.C. maximum, unless otherwise indicated, of following minimum sizes and weights:;2.375" O.D. steel pipe, 3.65 lbs. per linear ft. or 2.375" x 2.375" tubing, 3.11 lbs. per linear ft.

G. Gate Posts: Furnish posts for supporting single-gate leaf, or one leaf of a double gate installation as follows:

Gate Post Size	Weight
2.875" x 2.875" roll-formed section or 2.875" O. D. pipe	4.64 lbs./lf.

H. Tension Wire: 7 gauge, coated coil spring wire, metal and finish to match fabric. Locate at top of fabric.

I. Top and Bottom Rail: 1.625" O. D. pipe installed in a single piece between each post. Provide means for attaching rail to posts.

J. Wire Ties: 11 gauge galvanized steel

K. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use 1.66" O..D. pipe, 2.22 lbs. per ft. galvanized steel, and truss to line posts with 0.375" diameter rod and adjustable tightener.

L. Post Tops: Provide weather-tight closure cap with loop to receive tension wire; one cap for each post.

M. Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.

N. Stretcher Bars Bands: Space not over 15" O. C., to secure stretcher bars to end, corner, pull, and gate posts.

2.02 GATES

A. Fabrication: Fabricate perimeter frames of gates from metal and finish to math fence framework. Assemble gate frames by welding or with special fittings and rivets, for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8' apart unless otherwise indicated.

B. Swing Gates: Fabricate perimeter frames of minimum 1.90" O. D. pipe.

C. Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

a) Hinges: Size and material to suit gate size, on-life-off type, offset to permit 180 degrees gate opening.

b) Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

D. Concrete: Provide concrete in accordance with "Concrete Paving Specification."

PART 3 EXECUTION

3.01 General: Do not begin installation and erection before final grading is completed, unless otherwise permitted.

A. Excavation: Drill or set sleeves for posts in concrete to diameters and spacing's indicated in expanding grout.

B. Setting Posts: Center and align posts in concrete curbing. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

C. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with point on fabric side, using special offset fittings where necessary.

D. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

E. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gauge galvanized wire. Fasten fabric to tension wire using 11 gauge galvanized steel hog rings spaced 24" O. C.

F. Fabric: Leave approximately 2" between finish grade or slab and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

G. Stretcher Bars: Thread through or clamp to fabric 4" O.C. and secure to posts with metal bands spaced 15" O. C.

H. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

I. Tie Wires: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.

The fabric to line posts, with wire ties spaced 12" O.C. Tie fabric to rails and braces, with wire ties spaced 24" O.C. Tie fabric to tension wires, with hog rings spaced 24" O.C.

J. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

K. Repair damaged coating in the shop or during field erection by re-coating with manufacturer's recommended repair compound, applied per manufacturer's directions.
If damage to fabric or coating is extensive, remove and replace with new fabric.

END OF SECTION

02900